Magazines and Safe Sex: Are Better Informed Youth More Likely to Use Contraceptives and Condoms?

Research Thesis

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By

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Abstract:
When individuals choose to act, a critical determinant of their choice is the information they possess. I explore the relationship between information about sexually transmitted diseases and safe sex practices in adolescence and early adulthood. I examine whether individuals are more or less likely to use contraceptives when they read information about sexually transmitted diseases (STDs) in popular magazines. To characterize information about STDs, I track articles published in popular magazines from 1970 to 2014. To measure potential exposure to information, I use data on magazine reading habits of youth and adults to estimate models of whether and how intensively individuals read particular magazines. I use the estimated coefficients and articles to predict the information flow and stock of individuals who participated in the 1997 National Longitudinal Surveys of Youth (NLSY97). I estimate whether individuals are more likely to use contraceptives when they see more information about STDs.

I. Introduction:

Individuals who decide to have sex also decide whether to use contraceptives. They do so to reduce the probability of transmitting diseases, to prevent unwanted pregnancies, or both. In making this decision, these individuals face two separate issues: incomplete information and asymmetric information. These are both common market failures that are prevalent in several markets. With the first issue, each person involved in the decision to have sex may not be able to accurately determine whether his or her partner has a sexually transmitted disease. Therefore, he or she may not able to gauge the level of risk he or she face. With the second issue, an individual may have information about whether he or she has an STD, and may choose not to share that information with his or her partner. Asymmetric information also exists in decisions about pregnancy; for instance, a woman may have information about her own fertility that she chooses not to share with her partner.

Health advocates attempt to address issues of imperfect information by increasing a sexually active person's overall level of information. Though it may be impossible to increase one's information about a specific individual partner, health advocates hope to increase the total level of information regarding sexually transmitted diseases, the probability of acquiring them, and the different methods available to reduce that probability. The success of any such efforts depends on whether individuals use contraceptives more frequently after seeing information about STDs.

I evaluate the efficacy of addressing this market failure by looking at one source of information available to individuals who decide to have sex: magazine articles. I investigate whether magazine readers are more likely to use contraceptives and condoms when they see more information published in popular magazines on STDs and STD-related topics.

STDs today

Americans face a health risk from the transmission of sexually transmitted diseases. CDC researchers estimate a total of approximately 110 million cases of STD infections in the U.S. as of 2016, with an estimated twenty million newly acquired STDs each year. These cases impose an economic burden; the 2015 CDC Surveillance Report concludes that US consumers spend around 16 billion dollars annually on treating STDs.

Furthermore, many lesser known STDs are on the rise once again. A 1999 CDC report claimed that "the United States [faces] a unique opportunity to eliminate syphilis within its borders"[1]; however, the number of reported syphilis cases in the U.S. is now increasing for the first time since 2006. Similarly, the national rate of reported gonorrhea cases is increasing again after reaching a historic low in 2009. The Chlamydia infection rate has also been slowly but steadily rising since 2013. The reported rate of the nation's most commonly known STD, HIV, has been declining; however, the rate has slowed since 2010, even increasing in some categories such as male to male transition (CDC Surveillance Report 2015).

II. Review of Literature

Social scientists often seek to understand how information affects individual behavior. Researchers have built models addressing the effect of various sources of information on individual decisions, attitudes, and behaviors. Among the previously published literature, such models include: the effect of scientific journal articles on shell egg consumptions (Brown and Schrader 1990), social influence and peer group effects on risky behavior in adolescents (Clark and Lohéac, 2007), the effect of misperceptions of college drinking norms on the consumption of alcohol by college students (Perkins et al. 2015), and how parents' knowledge of their children's

[1] Centers for Disease Control and Prevention, Division of STD Prevention: National Plan to Eliminate Syphilis from the United States – Executive Summary. Published 1999.

experiences affect the likelihood that their children will participate in risky behavior (Crouter et al. 2005).

The impact of information has also been used to explain several dynamics of sexual behavior. Darroch et al. (2000) monitored the change of sexual education content and the general shift towards abstinence curricula, pointing towards political and social changes as influencing factors. Earlier papers have discussed the potential of school sexual education to increase a woman's decision to use birth control (Marsiglio and Mott, 1986). More recently, Carr and Packham (2016) wrote on the efficacy of sexual education courses and concluded that a switch to abstinence-based sex education does not have an effect on teen birth rates, and that "state-level policies may increase STD rates in states with small population". Bradner et al. (2000) also examined the effect of *less* information; they note that men have fewer sources of information on STDs after high school, and they use this change in mean levels of readily available information to explain why young adults are less likely to use condoms than teenagers.

Researchers characterize and measure information in several ways. They have utilized self-reported survey data (Perkins et al. 2015), indices of articles in medical journals (Brown and Schrader 1990), the content of nutrition labels (Wansink and Chandon 2006), pharmaceutical industry advertising of smoking cessation products (Avery et al. 2007), and explicit privacy warnings on website privacy policies (Larose and Rifon 2007). In addition, researchers have characterized and described certain events as information "shocks". Such "shocks" occur when single events may significantly add to the general public's overall level of information. Examples include the 1964 Surgeon General's Report on Smoking (USDHEW 1964) and the July 1981 publication of the Morbidity and Mortality Weekly Report, which outlined the first ever clinical

observation of acquired immunodeficiency syndrome in the United States (however, medical researchers did not use the acronym '*AIDS*' until a year later) (Friedman-Kein et al. 1981).

Social scientists have gone beyond studying general trends in the transmission of STDs to look specifically at why different cohorts, such as racial minorities and women, are often more susceptible to infection. Racial and ethnic minority groups have almost universally higher rates of STDs; for instance, African Americans had almost ten times the rate of gonorrhea as white Americans in 2015, and Hispanic Americans had twice the rate of gonorrhea as white Americans. Researchers have proposed several reasons for this prominent racial disparity, including the macro-level characteristics of African American populations (Aral et al. 2008), higher rates of participation in risky behaviors such as drug consumption (Hallfors et al. 2007), and more exposure to social conditions such as higher rates of incarnation and racial discrimination (Adimora et al. 2006). Some sociologists have also studied whether the credibility of information sources might become distorted by historical experiences specific to African Americans. Thomas and Quinn (1991) have outlined how the Tuskegee Syphilis Study still casts a long shadow and that "there remains a trail of distrust and suspicion that hampers HIV education efforts in Black communities"; Bogart and Thornburn (2005) have found similar results suggesting that there are high rates of conspiracy beliefs in African American communities that may counteract HIV prevention and safe sex initiatives.

While the racial disparity in STD rates remains high, the *gender* gap has narrowed over the past twenty years. However, the gap varies across specific STDs; for instance, while men and women have nearly equal rates of gonorrhea infections, women are much more likely to be diagnosed with chlamydia. In addition to facing higher rates of several STDs, women also usually suffer more harmful long-term effects. There are biological explanations for this

difference, since STDs are more likely to be asymptomatic among women. When undiagnosed, these diseases can cause cervical cancer, infertility, and ectopic pregnancy. However, researchers have also suggested that women are more likely to have STDs because of social and economic factors. Harvey et al. (2008) explained condom use as a result of interpersonal male-female relationships, finding that condom use was higher when women took a more active role in decisions about condom use as opposed to deferring to their partner. Other researchers have studied the crossover between economic poverty and social relations. Nyamathi et al. (2000) found that a higher network of social support, coupled with better AIDS knowledge, led to more regular testing among a multiracial sample of homeless women.

III. Data

I draw and combine data on magazine articles, individual-level demographics, and sexual behavior from seven separate sources. These include data on magazine articles about sexually transmitted diseases, data on individual magazine reading habit, and individual survey data on sexual practices, attitudes towards safe sex, and the use of contraceptives. I describe each data source briefly and provide more details in the following sections and in the Appendix.

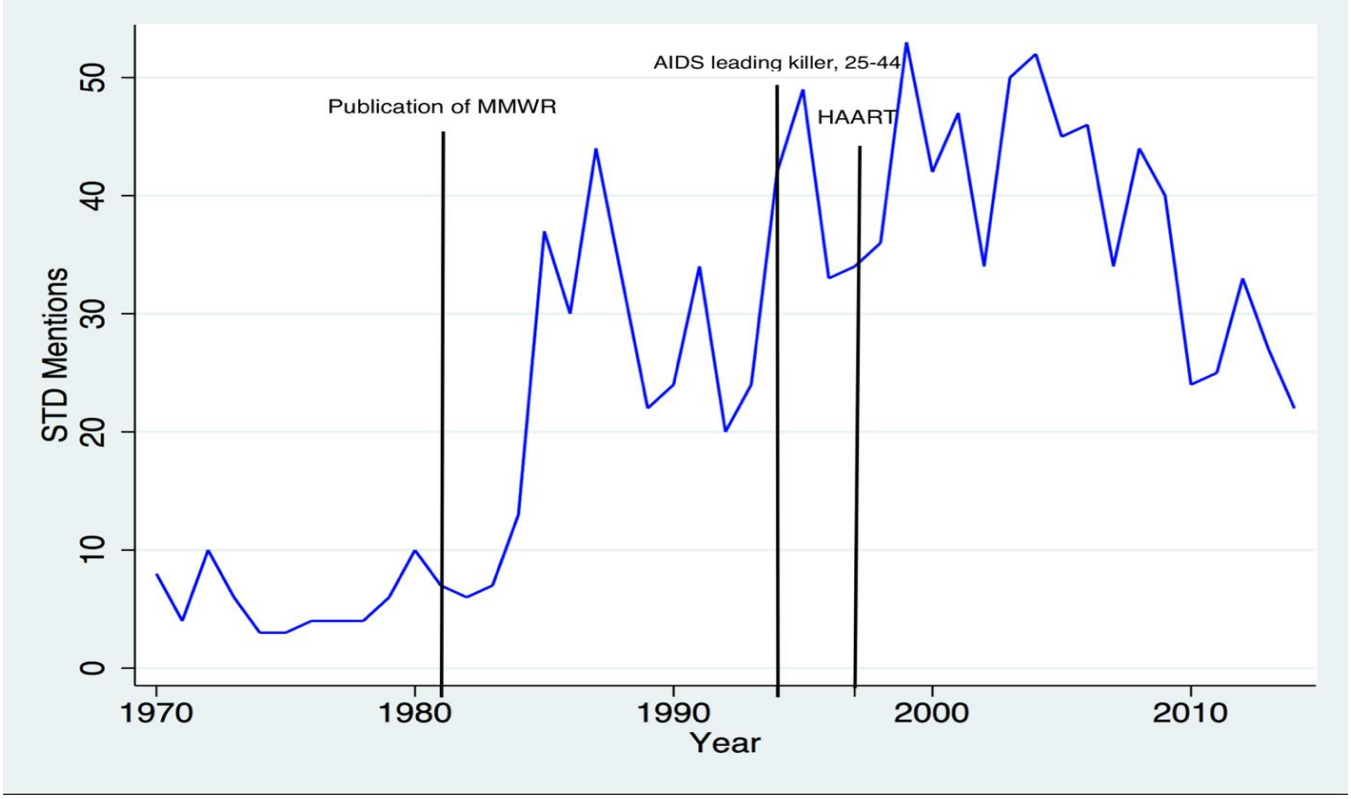
STD Information

To compile articles on sexually transmitted diseases and venereal diseases, I combine data from five separate indexing services. These services provide full text articles from myriad journals, academic journals, popular magazines, and public reviews; for the purposes of this paper, however, I only used search results from popular magazines. I list each indexing service in the Appendix. I used the following search terms to yield articles published between 1970 and 2014: ‘chlamydia’, ‘STDs’, ‘sexually transmitted diseases’, ‘venereal diseases’, and ‘herpes and sex’. In total, the data includes 1175 unique articles from 113 separate magazines, all published

between 1970 and 2014; though the content of the articles varies in the degree to which it discusses sexually transmitted diseases and related subjects, each article mentions STDs in some fashion. I also collect data on how many pages each article is. I provide a full list of all magazines collected from the indexing services in the Appendix.

Figure 1.

Count of articles that mention STDS, 1970 – 2014.



National Consumer Survey Data

In Figure 1, I plot the frequency of STD mentions in magazine articles published each from 1970 - 2014. I note some important events in the timeline of HIV/AIDS history that may be related to the frequency of mentions and the general climate surrounding the disease at that time. These events include the 1981 publication of the Morbidity and Mortality Weekly Report that outlined the first ever clinical observation of AIDS in the United States; 1982-1985 is a generally interesting period, starting with the first ever use of the term "AIDS" by the CDC in 1982 and

leading up to President Ronald Reagan mentioning AIDS publicly for the first time in 1985. I also note 1994, the year that AIDS became the leading killer for all Americans aged 25-44. Lastly, I note the appearance of *highly active antiretroviral therapy* (HAART) in 1997, the year this medication became the new standardized method of care for HIV, which then led to the first significant decline in AIDS-related deaths since the discovery of the disease.

For previous research projects, my advisor Dr. Dean Lillard used individual-level data from the 1995-2009 Simmons National Consumer Survey (NCS) to predict an individual's probability of readership *and* intensity of readership. He generated magazine-specific coefficients for each outcome and provided them to me. To generate those coefficients, Dr Lillard used the NCS to gather the magazine-reading habits of respondents to the survey. The NCS collects data in multiple phases: in phase I, interviewers collect demographic data and data on the magazines respondents read in person. In phase II, interviewers collect and review answers the respondent has given to the consumption questionnaire. The NCS's sample is a representative probability sample of the contiguous United States.

The NCS asks each respondent to identify whether, within the past six months, he or she has read each of 182 different magazines and how many of the past four issues he or she read. These data provide information on the probability a person read a magazine and data on how frequently he or she read that magazine. Interviewers show each respondent copies of the covers of the magazines, and they ask about reading habits over the past 6 months. They ask both if the respondent ever read the magazine, *and* how frequently they have read the magazine. The NCS also collects the respondent's demographic data, and Dr. Lillard uses the demographic data to predict the probability and intensity of readership. Dr. Lillard provided me coefficient estimates

for the 35 magazines included in the NCS survey in which articles appeared. He estimates those models using demographic data common to the NCS and the dataset I use.

National Longitudinal Survey of Youth 1997 Data (NLSY97)

I link the magazine information data and the predicted readership data to the National Longitudinal Survey of Youth 1997. The NLSY97 surveyed 8,984 individuals between the ages of 12 and 18 at the time of their first interview in 1997. The final NLSY97 sample is nationally

Table 1: Summary Statistics

Variable	Men	Women
Contraceptive and condom use measures		
Used a contraceptive during last sexual encounter	0.74	0.73
Used condom during last sexual encounter	0.56	0.48
Age at first sex	15.45	16.18
	(2.87)	(2.47)
Individual characteristics		
Age	21.18	21.20
	(5.60)	(5.61)
Total Income	20,019	15,282
	(22,024)	(17,131)
Years of schooling	13.50	14.20
	(6.18)	(5.33)
Educational attainment		
High school dropout	0.327	0.216
Some college	0.246	0.267
College grad or more	0.263	0.363
Race/ethnicity		
White	0.590	0.582
Black	0.263	0.274
Hispanic	0.114	0.112
Other	0.031	0.031
N (person-year)	86,426	82,486
N (persons)	4,599	4,385

Notes: Standard errors in parentheses. Figures for contraceptive use, condom use, educational attainment, and race/ethnicity denote percentages.

representative of that age group in 1997. The NLSY97 includes data on individual characteristics, personality traits, attitudes, behaviors, practices, and relationships. Furthermore,

the first round of the NLSY97 included a parent questionnaire that gathered information on each respondent's background and family history.

I use NLSY97 data measuring if and when the respondent has had sex, whether or not the respondent used contraceptives during their last sexual encounter, and whether he or she specifically use a condom during their last sexual encounter[2]; these are all separate, testable dependent variables. I also gather data on individual demographic characteristics to control for in my estimates; these include gender, race, age, total personal income, and highest level of education, all of which are included in a combined vector in the final regression. I also generate age squared, age cubed, and a log of total income. Table 1 describes the sample characteristics.

Empirical Strategy:

Measure of Individual Information

I construct measures of the flow and stock of information each individual receives or holds in any given year. I assume that the individual first starts building his information stock on sexual behavior at the age of 12. As noted above, I characterize information by the content of articles published in popular consumer magazines from 1993 to present. To construct the information measures I need to know whether or not an individual read the magazines in which the articles appear. I do not because the NLSY97 does not collect information about whether and how often a person reads each magazine. To solve this problem, I rely on coefficients from models of magazine reading behavior that Dr. Lillard produced for another project using data that do track individual magazine reading habits. I briefly describe what those data are, how Dr. Lillard generated them, and how I use them.

[2] It is important to note that the NLSY asks whether an individual *or the individual's partner* used a contraceptive or a condom during their last sexual encounter.

As mentioned above, the NCS asks each respondent whether he or she has read a magazine and how many of the past four issues he or she has read. Dr. Lillard used those data to estimate models whose dependent variable was one of those two outcomes (probability of reading and intensity of reading a given magazine). He specified those decisions as functions of individual demographic characteristics commonly available in the NCS and NLSY97 data (plus a cubic calendar time trend). The explanatory variables in those models consisted of age, age squared, and age cubed, sex, three race indicators (black, Hispanic, and other), years of attained schooling, and calendar year (minus 1994), year squared, and year cubed. He fit those models (on each outcome) separately for each of *35* magazines and saved the resulting coefficient estimates. He formally estimates these models:

(1)

(2)

where is the individual's probability of reading a magazine *m* in year *t*, is the intensity with which he or she reads the magazine, and is a vector of the above characteristics. For each magazine and each model, Dr. Lillard saved the vector of 14 coefficients, .He then shared the coefficients with me.

I merge the coefficients for the probability and the intensity of readership with my NLSY97 dataset. I use two algorithms to predict the probability and intensity of readership for each individual *i*. The algorithms vary according to whether or not the individual is 12-17 or 18 and older. In every year *t* where a NLSY97 respondent is 18 or older, I simply use the saved coefficients and the individual's demographics to generate a predicted probability of readership and a predicted intensity of readership, .

For individuals aged 12-17, I face a dilemma: the NCS data on magazine readership do not include any individuals under the age of 18. The problem here is that even with a third-order polynomial in age and calendar time, the predicted probability and intensity of readership for an individual sometimes take on invalid values (such as negative values or values greater than 1). I considered and rejected several potential solutions, such as forcing the values to 0/1, where I change all predicted negative values to 0 and all values over 1 to 1, or simply dropping the observations where the values are invalid.

Instead, I collect the relevant demographics and characteristics of each NLSY97 respondent's parent, and then generate a probability and intensity of readership for each respondent's parent. The maintained assumption is that if an individual under 18 is living with one or both of his parents, and that if the parent(s) is likely to read the magazine, then there is a probability that the individual will read the magazine as well since it is in the home.

I then regress an individual's (18 or older) probability of readership on each parent's probability of readership and a gender indicator, and generate a new variable that predicts an individual's probability of readership based on the parent's probability of readership. I do the same for intensity of readership. I use those predicted values for when individuals are under 18, and I adjust the algorithm to account for if the individual lives with only one parent[3].

Therefore, I now have the and variables for each individual in the NLSY97 sample. I multiply those variables with , the number of articles that mention STDs in magazine *m* in year *t*. This represents a person's information flow from one

[3] For each individual, I have two predicted probability of readership values: one is based on the father's probability, and one is based on the mother's. The same is the case for intensity of readership. If an individual is under 18 and lives with only one of his or her parents, I use the predicted probability that is based on the probability of the parent he or she lives with. If the individual is under 18 and living with both parents, I use the higher predicted probability. I do the same for intensity of readership.

magazine *m* in year *t*. Therefore, each individual's is a summation of the product of those variables for each magazine *m* in year *t*:

(3)

I add a *c* superscript to . This is because it is a function of , which is a *count* of the total number of articles appearing in a magazine in a year. I construct another measure of information flow, , which is again a function of probability of readership and intensity of readership; however, it is different in that it uses the total combined number of pages about STDs appearing in a magazine *m* in a year *t* rather than the count of articles.

(4)

I now have two measures of information flow for each individual *i* from each magazine *m* at time *t.* The information stock for an individual *i* at time *t* is the summation of the information flow from the year *t-K* when the individual was 12 years old up to the previous year *t.* I construct two information stocks, one based on the count of articles in a magazine in a year, and one based on the total number of pages in a magazine in a year:

(5)

(6)

Table 2 summarizes the information flow and stock measures:

Table 2.

Mean and standard deviation of information flow and stock

	Men (N=110915)		**Women (N=87857)**	
Information	**Articles**	**Pages**	**Articles**	**Pages**
Information flow	0.706	2.929	0.983	3.882
	(0.904)	(5.069)	(1.236)	(6.529)
Information stock	5.999	20.363	8.559	27.446
	(8.285)	(32.558)	(10.983)	(41.758)

Economic Model and Identification

I link the information measure to the NLSY97 data on contraceptive usage, and then use a relatively straightforward empirical strategy. I estimate linear probability models of the decision to use contraceptives as a function of information from magazine articles about sexually transmitted diseases and STD-related subjects. The basic model of contraceptive usage is:

(7)

where is a measure of contraceptive use during an individual's last sexual encounter, condom use during the last sexual encounter, and his or her first report of ever having sex.

and are the primary explanatory variables under study. I run models both for the information measures that are based on article count and for the ones based on total number of pages.

is a vector of control variables that includes age, age squared, race, gender, a log of personal income, and highest level of education. The reasons for the inclusion of these specific controls are economically intuitive. I include individual demographic characteristics since previous literature has found racial and gender gaps in STD rates and contraceptive usage. I include the age control for a similar reason, since individuals change their sexual behavior as they get older. I include the log of individual income since I predict that income levels correlate to rates of contraceptive usage. I include level of education (specifically, the measure of highest grade completed, since it is the measure with the least potential variation) and previous contraceptive knowledge to control for any effects arising from one's own informational background. Lastly, is a time fixed effects variable.

IV. Results

Table 3 details the results of three different models I estimated. Model 1 uses contraceptive usage during an individual's last sexual encounter as the dependent variable; Model 2 uses condom usage during an individual's last sexual encounter as the dependent variable; and Model 3 uses a dummy that turns to 1 the first year someone has sex as the dependent variable. Each model in table 3 uses the information measures that are based on article count as the independent variables. Table 4 and 5 show the same models, but run only for women and men respectively. Table 6 includes models that instead use the information measures based on combined number of pages. Table 7 and 8 show the same models as Table 6, but run only for women and men respectively.

Each model includes the coefficient estimates and standard errors for the information measures, the individual's highest grade completed, and a log of the individual's total income. I also include age, age squared, a gender indicator, and three race indicator (black, Hispanic, and other). I generally find a positive relationship between the information an individual has on STDs and his or her contraceptive and condom use.

I interpret the results, discuss the limitations of my research, and suggest ways to improve the paper in the following sections.

Table 3.

OLS model: relationship between dependent variables and magazine information measures generated by article count for both genders

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0125	0.0101	-0.0113
	(0.0055)*	(0.0059)	(0.0042)**
Information Stock	0.0024	0.0012	-0.0010
	(0.009)**	(0.0011)	(0.0004)*
Highest Grade Completed	0.0091	0.0029	-0.0023
	(0.0020)**	(0.0015)*	(0.0006)**
Log of Income	0.0127	-0.0042	0.0183
	(0.0047)**	(0.0053)	(0.0026)**
Age	-0.2033	-0.1196	0.0237
	(0.0428)**	(0.0506)*	(0.0059)**
Age Squared	0.4784	0.3045	-0.1061
	(0.1057)**	(0.1251)*	(0.0129)**
Female	-0.0307	-0.1021	0.0076
	(0.0107)**	(0.0121)**	(0.0059)
Black	-0.0925	0.0580	0.0519
	(0.0165)**	(0.0174)**	(0.0108)**
Hispanic	-0.0890	-0.0026	0.0268
	(0.0188)**	(0.0204)	(0.0118)*
Other (race)	-0.0546	0.0289	0.0025
	(0.0370)	(0.0385)	(0.0125)
Constant	2.6663	1.7100	0.0150
	(0.4259)**	(0.5039)**	(0.0561)
R^2	0.02	0.02	0.06
N	9622	9604	15637

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

Table 4.

OLS model: relationship between dependent variables and magazine information measures generated by count, *for women*

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0144	0.0153	-0.0130
	(0.0072)*	(0.0077)*	(0.0051)*
Information Stock	0.0027	0.0015	-0.0007
	(0.0011)*	(0.0013)	(0.0005)
Highest Grade Completed	0.0088	0.0015	-0.0026
	(0.0026)**	(0.0018)	(0.0012)*
Log of Income	0.0055	-0.0128	0.0167
	(0.0064)	(0.0073)	(0.0036)**
Age	-0.1087	-0.1084	0.0216
	(0.0626)	(0.0734)	(0.0083)*
Age Squared	0.2540	0.2880	-0.1016
	(0.1546)	(0.1815)	(0.0182)**
Black	-0.1159	0.0494	0.0531
	(0.0250)**	(0.0267)	(0.0143)**
Hispanic	-0.0941	0.0088	0.0201
	(0.0279)**	(0.0311)	(0.0154)
Other (race)	-0.0610	0.0205	-0.0080
	(0.0486)	(0.0530)	(0.0162)
Constant	1.7165	1.526	0.0616
	(0.6256)**	(0.7326)*	(0.0803)
R^2	0.02	0.01	0.06
N	4570	4563	7990

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

Table 5.

OLS model: relationship between dependent variables and magazine information measures generated by count, *for men*

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0133	0.0031	-0.0086
	(0.0090)	(0.0096)	(0.0079)
Information Stock	0.0019	0.0009	-0.0013
	(0.0016)	(0.0018)	(0.0007)
Highest Grade Completed	0.0096	0.0047	-0.0022
	(0.0031)**	(0.0023)*	(0.0007)**
Log of Income	0.0205	0.0045	0.0199
	(0.0069)**	(0.0077)	(0.0037)**
Age	-0.3045	-0.1374	0.0255
	(0.0582)**	(0.0701)	(0.0084)**
Age Squared	0.7200	0.3377	-0.1101
	(0.1438)**	(0.1731)	(0.0183)**
Black	-0.0734	0.0679	0.0495
	(0.0221)**	(0.0230)**	(0.01636)**
Hispanic	-0.0835	-0.0114	0.0341
	(0.0254)**	(0.0269)	(0.0183)
Other (race)	-0.0433	0.0414	0.0153
	(0.0573)	(0.0561)	(0.0191)
Constant	3.640	1.829	-0.0198
	(0.5765)**	(0.6959)**	(0.0791)
R^2	0.02	0.01	0.06
N	5052	5041	7647

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

Table 6.

OLS model: relationship between dependent variables and magazine information measures generated by combined number of pages in articles for both genders

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0023	0.0019	-0.0001
	(0.0007)**	(0.0008)*	(0.0006)
Information Stock	0.0006	0.0004	-0.0007
	(0.0003)*	(0.0003)	(0.0001)**
Highest Grade Completed	0.0093	0.0029	-0.0023
	(0.0020)**	(0.0015)*	(0.0006)**
Log of Income	0.0125	-0.0041	0.0186
	(0.0047)**	(0.0053)	(0.0026)**
Age	-0.2009	-0.1185	0.0195
	(0.0429)**	(0.0508)*	(0.0058)**
Age Squared	0.4699	0.2985	-0.0912
	(0.1062)**	(0.1258)*	(0.0125)**
Female	-0.0280	-0.1012	0.0070
	(0.0106)**	(0.0120)**	(0.0059)
Black	-0.0927	0.0552	0.0568
	(0.0158)**	(0.0169)**	(0.0110)**
Hispanic	-0.0878	-0.0019	0.0259
	(0.0188)**	(0.0204)	(0.0119)*
Other (race)	-0.0525	0.0294	0.0022
	(0.0368)	(0.0384)	(0.0124)
Constant	2.6568	1.7038	0.0339
	(0.4266)**	(0.5056)**	(0.055)
R^2	0.02	0.02	0.06
N	9622	9604	15637

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

Table 7.

OLS model: relationship between dependent variables and magazine information measures generated by combined number of pages in articles, *for women*

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0021	0.0022	-0.0004
	(0.0010)*	(0.0010)*	(0.0007)
Information Stock	0.0008	0.0006	-0.0008
	(0.0004)*	(0.0004)	(0.0001)**
Highest Grade Completed	0.0090	0.0016	-0.0025
	(0.0027)**	(0.0018)	(0.0012)*
Log of Income		-0.0128	0.0171
	)	(0.0074)	(0.0036)**
Age	-0.0962	-0.0994	0.0172
	(0.0628)	(0.0738)	(0.0082)*
Age Squared	0.2185	0.2604	-0.0846
	(0.1553)	(0.1828)	(0.0176)**
Black	-0.1125	0.0521	0.0598
	(0.0237)**	(0.0255)*	(0.0150)**
Hispanic	-0.0930	0.0099	0.0194
	(0.0279)**	(0.0311)	(0.0156)
Other (race)	-0.0584	0.0221	-0.0084
	(0.0481)	(0.0530)	(0.0162)
Constant	1.618	1.4608	0.0728
	(0.6262)*	(0.7355)*	(0.0798)
R^2	0.02	0.01	0.06
N	4570	4563	7990

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

Table 8.

OLS model: relationship between dependent variables and magazine information measures generated by combined number of pages in articles,*for men*

Dependent Variables	**Contraceptive usage during last sexual encounter**	**Condom usage during last sexual encounter**	**Respondent first reported having sex**
Variables	**1**	**2**	**3**
Information Flow	0.0030	0.0016	0.0007
	(0.0012)**	(0.0013)	(0.0009)
Information Stock	0.0004	0.0001	-0.0009
	(0.0004)	(0.0005)	(0.0002)**
Highest Grade Completed	0.0100	0.0046	-0.0023
	(0.0031)**	(0.0022)*	(0.0007)**
Log of Income		0.0048	0.0201
	)**	(0.0077)	(0.0037)**
Age	-0.3075	-0.1421	0.0212
	(0.0584)**	(0.0702)*	(0.0082)**
Age Squared	0.7252	0.3483	-0.0965
	(0.1442)**	(0.1735)*	(0.0178)**
Black	-0.0759	0.0604	0.0525
	(0.0214)**	(0.0225)**	(0.0165)**
Hispanic	-0.0821	-0.011	0.0332
	(0.0254)**	(0.0269)	(0.0184)
Other (race)	-0.0417	0.0412	0.0153
	(0.0573)	(0.0559)	(0.0189)
Constant	3.680	1.8803	0.0072
	(0.5772)**	(0.6967)**	(0.0779)
R^2	0.02	0.01	0.06
N	5052	5041	7647

Notes: Standard errors are in parentheses. * and ** denote coefficients that statistically differ from zero with * $p < 0.05$, ** $p < 0.01$. Standard errors are clustered by ID.

V. Interpretation of Results

To consider the results in context, I must interpret the significance of these coefficients and what they imply for the behavior under study. I consider the potential increase in contraceptive use, condom use, and the probability of a youth first reporting having sex. I can reasonably use the standard deviation to measure how much one's information potentially increases in a year. Therefore, I multiply the coefficient for each of my four information

measures by the standard deviation of the information measures. I divide the result by percentage of individuals who responded yes to questions on contraceptive use, condom use, and reports of first sex. In table 9, I show the results for both genders, for women only, and for men only.

Another way to consider this is to look at the individuals who said they didn't use contraceptives or condoms the last time they had sex. I evaluate how the information measures can induce those who didn't use contraceptives or condoms into using them. To do this, I multiply the coefficients for the information measures by the standard deviations of the information measures, and divide the result by the percentage of individuals *who responded no* to questions on contraceptive use, condom use, and reports of first sex. In table 10, I show results for both genders, women only, and men only. Note that for both tables, I only compute these values for coefficients with p-values < 0.05, which explains why there are multiple blank values.

Table 9.

Standard Deviation of info measures multiplied by the coefficient of info measures as a fraction of individuals who engaged in behavior

Variable	Contraceptive usage during last sexual encounter		Condom usage during last sexual encounter		Respondent first reported having sex	
			Both Genders			
	Count	**Pages**	**Count**	**Pages**	**Count**	**Pages**
Flow	0.0185	0.0183	-	0.0212	-0.0853	-
Stock	0.0320	0.0306	-	-	-0.0678	-0.1820
			Women			
Flow	0.0244	0.0188	0.0396	0.0301	-0.1121	-
Stock	0.0407	0.0458	-	-	-	-0.2329
			Men			
Flow	-	0.0206	-	-	-	-
Stock	-	-	-	-	-	-0.2022

Table 10.
Standard Deviation of info measures multiplied by the coefficient of info measures as a fraction of individuals who *didn't* engage in behavior

Variable	Contraceptive usage during last sexual encounter		Condom usage during last sexual encounter		Respondent first reported having sex	
			Both Genders			
	Count	**Pages**	**Count**	**Pages**	**Count**	**Pages**
Flow	0.0511	0.0506	-	-	-0.0144	-
Stock	0.0882	0.0845	0.0234	-	-0.0114	-0.0307
			Women			
Flow	0.0657	0.0506	0.0363	0.0275	-0.0188	-
Stock	0.1093	0.1232	-	-	-	-0.0390
			Men			
Flow	-	0.0582	-	-	-	-
Stock	-	-	-	-	-	-0.0343

One can draw several inferences from the above tables. First, it is clear that the information measures are a stronger predictor of contraceptive use during one's last sexual encounter than condom use. The difference between genders is also notable. Although not statistically different, women tend to respond more on average to the information measures in terms of increasing their likelihood of using contraceptives or condoms. This can be for several reasons, such as the fact that a woman potentially holds a larger share of responsibility from pregnancy and disease. Lastly, when the results are statistically significant, information measures always negatively correlate with the likelihood of someone reporting having sex for the first time. This fits with the theoretical framework, as individuals may be hesitant to engage in sex after learning more about the associated risks. I discuss some wider implications, as well as the limitations of my research, in the final section.

VI. Conclusion and Future Directions:

I use two different measures of information, flow and stock, to demonstrate the positive relationship between an individual's level of information on STDs and his likelihood of using a contraceptive during sex. Other coefficients in my estimation show results similar to those established by previously published research. I find that women and minorities are less likely to use contraceptives after holding education, information level, and other factors constant. Moreover, after holding information levels constant, I find a robust positive correlation between an individual's education and his decision to use a contraceptive. Higher levels of education also correlate negatively with someone's decision to have sex for the first time.

Limitations

The most necessary future step for this research project is to conduct a deeper examination of the *content* of the articles included in this thesis. This would help strengthen an argument for causality. I used a simple numeric categorization: any article that mentioned the search terms I have listed earlier was part of the data. However, these articles vary significantly in the *extent* to which they discuss STDs. For instance, some articles only mention STDs very passively as part of a larger commentary on health, while others go into a categorical review of the dangers of unprotected sex. Furthermore, some articles discuss sex positively (even if they mention STDs), while some discuss sex more cautiously. In the future, I intend on examining the articles included in the data, and separating them into categories based on how they discuss sex and STDs: the categories will be "positive description", "negative description", "neutral description". I may also attach a coefficient to each article that ranges from 0-1, and this coefficient will be a scale that measures *how deeply* an article discusses STDs. This scale can be

determined empirically (the simplest way to do this is to count of how many times the article mentions STDs) or through a qualitative judgement. I will then develop more information measures that are a function of this categorization and scaling. I would predict that using such methods to refine the information measures would also result in lower standard deviations on the information level coefficients, and therefore yield more accurate results.

I also hope to include a wider dataset in my future research on this topic. Since individuals in the NLSY97 were maturing and becoming sexually active in the late 90's and 2000's, a large portion of their information levels was probably gathered through the internet. I intend on using a similar research process on the NLSY79; this earlier survey, which first interviewed individuals in 1979, should diminish distorting effects arising from internet access.

I do not consider other sources of information that an individual is exposed to, which adds another limitation to this paper. In the future, it would be beneficial to cast a wider net when considering sources of information, and include sources such as radio, television, and magazine advertisements (not just articles). Lastly, it would be interesting to explore the effects of important pop culture events that may be defined as "shocks" to public knowledge about STDs; while such "shocks" may be difficult to define, they can include examples such as basketball player Magic Johnson's announcement that he is HIV-positive in 1991, or Freddie Mercury's death from AIDS-related illness later that same year.

Conclusion

Knowledge of sexually transmitted diseases, their transmission, and the methods with which they can be reduced, is still not as widespread as health practitioners wish it to be. Policymakers and researchers considering the implications of STD-awareness efforts must evaluate how individuals respond when they learn more about STDs. My aspiration in this paper

was to go outside the formal channels of sexual education and to measure how information gathered through popular magazines affects safe sex practice. Though there are several limitations to my analysis, I do establish a robust positive relationship between the information people have, measured both as a yearly flow and an accumulating stock, and their decision to use contraceptives and condoms.

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Appendix.

All magazines included in my dataset are listed here in alphabetical order:

Advocate
America
American Health
American Heritage
American Indian Quarterly
American Indian Quarterly
American Spectator
Atlanta
Better Homes & Gardens
Better Nutrition
BioScience
Bloomberg Businessweek
Christian Century
Christianity Today
Cincinnati
Commentary
Los Angeles Magazine
Maclean's
McCall’s
MIT's Technology Review
Ms.
Commonweal
Consumer Reports
Consumers' Research Magazine
Crisis
Current Health 2
Current Science
Dance Magazine
Delicious Living
Discover
Ebony
Education Digest
Esquire
Essence
FDA Consumer
Forbes
Futurist
Popular Science
Powder
Practical Horseman
Prevention
Radio-Electronics
Glamour
Good Housekeeping
GQ: Gentlemen's Quarterly
Harper's Bazaar
Harper's Magazine
Health
Hispanic
Human Behavior
Human Events
Humanist
Iceland Review
Indianapolis Monthly
Indianapolis Monthly
Issues in Science & Technology
Ladies' Home Journal
Life
Seventeen
Smithsonian
Stereo Review
Technology Review
US News & World Report

Nation

National Geographic

National Parks

National Review

Natural History

New Leader

New York

New York Times

New York Times Magazine

New Yorker

Newsweek

Parenting

Parenting's Baby Talk

Parents

Parents & Better Family Living

People Weekly

Policy Review

Progressive

Psychology Today

Public Interest

Publishers Weekly

Reader's Digest

Reason

Redbook

Rolling Stone

Sassy

Saturday Evening Post

Saturday Night

Saturday Review

Scholastic Choices

Science

Science News

Scientific American

SciQuest

Teen Magazine

Texas Monthly

Time

Today's Health

Today's Education (General Edition)

Training & Development Journal

UN Chronicle

US Catholic

USA Today Magazine

Vogue

Walrus

Washington Monthly

Washingtonian Magazine

Women's Health

World Health

World Press Review

Source note: All articles published in the magazines listed above and included in the data used for this paper were extracted from the following online full-text indexing services: Academic Search, MAS Ultra – School Edition, Masterfile Premier, Reader's Guide Retrospective and Reader's Guide Full Text Select.